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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/822,425	04/12/2004	Roger L. Frick	E252.12-0008	2555

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EXAMINER	
TURNER, SAMUEL A	
ART UNIT	PAPER NUMBER
2877	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/822,425	FRICK, ROGER L.	
	Examiner	Art Unit	
	Samuel A. Turner	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 November 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,9-18,20-27,29-34 and 36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5,6,9,11-18,20-25,27,29-34 and 36* is/are rejected.

7)☒ Claim(s) *3,4,10 and 26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on *27 November 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/28/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 1-6, 9-18, 20-27, 29-34, and 36 have been considered but are moot in view of the new ground(s) of rejection.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 27 November 2006 has been considered by the examiner.

Title

The title of the invention is not descriptive. A new title is required that is clearly indicative of the **invention** to which the claims are directed.

Drawings

An amendment to the drawings was received on 27 November 2006. These drawings are accepted by the examiner.

Claim Objections

Claims 2 and 12 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 2 and 12 have the limitation "wherein the resonator comprises a dielectric resonator". Independent claim 1 includes the limitation "the electromagnetic resonator having a dielectric body", and independent claim 9 includes the limitation

"a resonator having a dielectric body". Both independent claims 1 and 9 already include a limitation defining the resonator as a dielectric resonator, therefor claims 2 and 12 do not further limit the claims from which they depend.

Claims 18 and 29-34 are objected to under 37 CFR 1.75(c), as being of improper dependent form for depending on a cancelled claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 18 depends on cancelled claim 35. For purposes of any rejection claim 18 will be treated as depending on the claim from which claim 35 depended which was claim 27.

Claim 29 depends on cancelled claim 28. For purposes of any rejection claim 18 will be treated as depending on the claim from which claim 28 depended which was claim 27. Further, there is no antecedent basis for "the interior surface". Claims 30-34 depend on claim 29 and thus are included in the objection.

Claim Rejections - 35 USC § 112, second paragraph

The following is a quotation of the second paragraph of 35 U.S.C. § 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 17, 20, and 29-34 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With regard to claim 17, there is no antecedent basis for "the variable cavity gap". Antecedent basis is only provided for "a variable configured to produce an effective dielectric constant", the term gap is missing between variable and configured. Claim 20 is dependent from claim 17 and therefor is also included in the rejection.

With regard to claim 29, the phrase "on one of the interior surfaces" is indefinite because it fails to define the location of the conductor. The location of the claimed interior surface is not defined relative to the body, cavity, or gap. Claims 30-34 are dependent from claim 29 and therefor are also included in the rejection.

With regard to claims 30-34, the phrase "the conductor is configured to cause the sensor to resonate" is incomplete because there is insufficient structure claimed to form the specific resonate structure claimed.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 9, 11-13, 15, 16, 18, 22, 24, 25, 27, 29, and 36 are rejected under 35 U.S.C. § 102(e) as being clearly anticipated by Thomson et al(2005/0241403).

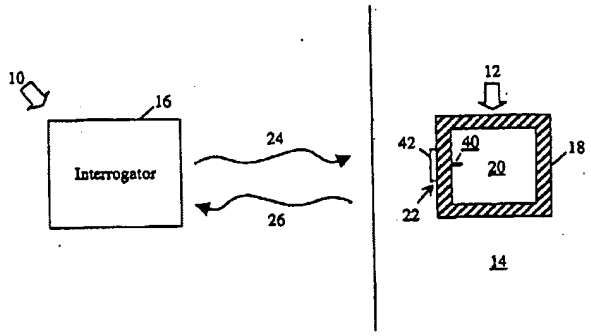


Figure 1

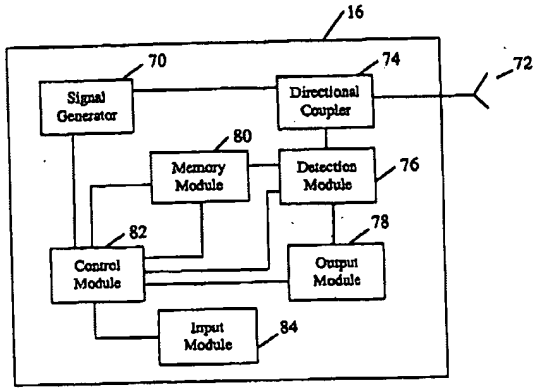


Figure 8a

With regard to claim 9, Thomson et al teach a sensor for use in measuring a measurable parameter(Fig's 1,8a), the sensor comprising:

a source of sub-optical electromagnetic energy(Fig. 8a, 70); and

a resonator having a dielectric body with a variable cavity gap responsive to changes in the measurable parameter at a sensing surface(Fig. 1, 20; paragraph [0106]),

the resonator defining a resonant frequency of a standing electromagnetic wave in the dielectric body and the variable cavity gap that is dependent upon the measurable parameter at the sensing surface, the resonator being disposed such that a signal from the sensor is a function of the resonant frequency(Fig. 1, 20; paragraph [0046]):

wherein the dielectric body and the variable cavity gap are configured to resonate at sub-optical frequencies as a function of the measurable parameter(paragraphs [0056]-[0058]).

As to claim 11/9, wherein the resonator forms a resonator that is external to the source(Fig. 1).

As to claim 12/9, wherein the resonator comprises a dielectric resonator(paragraph [0106]).

As to claim 13/9, wherein the resonator comprises a resonant antenna(Fig. 1, 42).

As to claim 15/9, wherein the measurable parameter is selected from the group consisting of pressure, temperature, flow rate, material composition, force, and strain(paragraph [0046]).

As to claim 16/9, further comprising a measuring apparatus for measuring the frequency of the signal(Fig. 8a, 76).

As to claim 18/27?, wherein the measurable parameter is selected from the group consisting of pressure, temperature, flow rate, material composition, force, and strain(paragraph [0046]).

With regard to claim 22, Thomson et al teach a method of sensing a measurable parameter(Fig's 1,8a), the method comprising:

providing a resonator characterized by a resonant frequency that is a function of a variable gap in an internal cavity of a dielectric body of the resonator,

the variable gap being responsive to the measurable parameter(**paragraphs [0046],[0106]**);

supplying sub-optical electromagnetic energy to the resonator to produce an electromagnetic standing wave in the dielectric body and the variable gap (**paragraphs [0056]-[0058]**); and

sensing a sub-optical resonant frequency of the electromagnetic standing wave to determine the measurable parameter(**paragraph [0079]**).

With regard to claim 24, Thomson et al teach a resonator having a dielectric body with a variable gap that varies in response to changes in a measurable parameter(**Fig. 1, 20; paragraph [0106]**),

the resonator configured for receiving sub-optical electromagnetic energy and producing an electromagnetic standing wave in the dielectric body and the variable gap so that a characteristic of the sub-optical electromagnetic energy changes in response to variations in the variable gap(**paragraph [0046]**);

wherein the dielectric body and the variable gap are configured to resonate at sub-optical frequencies as a function of the measurable parameter(**paragraphs [0056]-[0058]**).

As to claim 25/24, wherein the sub-optical electromagnetic energy is a continuous wave and the characteristic is frequency(**paragraphs [0082]-[0083]**).

With regard to claim 27, Thomson et al teach an electromagnetic resonant sensor(**Fig's 1,8a**) comprising:

a dielectric sensor body(Fig. 1, 18; paragraph [0106]); and

a cavity within the sensor body having a variable gap between interior surfaces of the sensor body that varies as a function of a measurable parameter, the cavity being positioned within the sensor body so that an electromagnetic standing wave is formed within the body and the variable gap, and a resonant frequency of the sensor is a function of the measurable parameter(Fig. 1, 20; paragraph [0046]);

wherein the sensor body and cavity are configured to resonate at sub-optical frequencies as a function of the measurable parameter(paragraphs [0056]-[0058]).

As to claim 29/28?, further comprising a conductor on one of the interior surfaces(paragraph [0059]).

With regard to claim 36, Thomson et al teach an electromagnetic resonant sensor for receiving sub-optical electromagnetic energy and producing an output based upon an electromagnetic standing wave having a resonant frequency that is a function of a parameter to be measured(Fig's 1,8a),

the sensor characterized by a dielectric body with a variable gap that changes dimension as a function of the parameter(Fig. 1, 20; paragraphs [0046],[0106]),

the dielectric body and the variable gap being configured to resonate at sub-optical frequencies as a function of the measurable parameter so that the electromagnetic standing wave extends within the dielectric body and the variable gap and a change in gap dimension causes a change in the resonant frequency (paragraphs [0056]-[0058]).

Applicant provides support for the use of microwave frequencies at least as far back as 28 November 2001, However, applicant first provides support for suboptical frequencies in the instant application which has a filing date of 12 April 2004. Therefor the 102(e) date of the Thomson 1 July 2002 is not overcome by applicant's claim of priority.

Claim 14 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Thomson et al(2005/0241403).

With regard to claim 14/9, Thomson et al teach that the methods for coupling energy in and out of the cavity are the same as those used for waveguides. These include probes, loops, and slots. However, Thomson et al **fail to teach** wherein the resonator comprises a resonant transmission line.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Thomson to couple energy into and out of the cavity by using a waveguide transmission line as coupler 22.

The motivation for this modification is found in Thomson et al because a probe, loop, and slot areknown microwave transmission lines.

Claim 21 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Thomson et al(2005/0241403) in view of Billeter(3,909,713).

With regard to claim 21, Thomson et al teach a variable frequency resonator comprising an electromagnetic resonator having a dielectric body and a cavity defining a variable gap(**Fig. 1, 20; paragraph [0106]**), the resonator producing an

output at a resonant frequency that is dependent upon the variable gap which is disposed to alter an electromagnetic standing wave in response to changes in the measurable parameter(**Fig. 1, 20; paragraph [0046]**);

wherein the dielectric body and the cavity are configured to resonate at sub-optical frequencies as a function of the measurable parameter(**paragraphs [0056]-[0058]**).

Thomson et al teach that different resonant frequencies excite different modes in the cavity which can make the sensor sensitive to strains in different directions, but **fail to teach** wherein a ratio of stored electric field and magnetic field energy of an electromagnetic standing wave in response to changes in the measurable parameter(**paragraph [0064]**).

Billeter teaches that transverse electric(TE) mode is sensitive to changes in two directions while the transverse magnetic(TM) mode is sensitive to changes in only one direction in the resonance cavity(**column 6, lines 49-56**).

It would have been obvious to one of ordinary skill in the art at the time the invention was made that because the different modes are sensitive to changes in different aspects of the resonant cavity, as found in Billeter and suggested by Thomson, any change in the resonant cavity will effect the ratio of the electric field to magnetic field. This is caused by the energy of the TE and TM modes relatively changing by strains along two different directions in the resonant cavity.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See In re Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); In re Van Ornum, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); In re Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, In re Thorington, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 2, 22, and 23 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 14, 43, and 49 of U.S. Patent No. 6,901,101. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claimed subject matter of U.S. Patent No. 6,901,101 anticipates the claimed limitations of the instant application.

1. A sensor for measuring a measurable parameter, the sensor comprising(6,901,101; claim 1, lines 1-4):

a source of electromagnetic energy(6,901,101; claim 1, lines 1-2); and

an electromagnetic resonator, disposed to receive at least a portion of the electromagnetic energy(6,901,101; claim 1, lines 5-6), the electromagnetic resonator having a dielectric body with a sensing surface responsive to changes in the

measurable parameter at the sensing surface and the electromagnetic resonator defining a cavity forming a variable gap that varies in response to the sensing surface and that is positioned such that a resonant frequency associated with an electromagnetic standing wave in the dielectric body and the variable gap changes in response to changes in the measurable parameter(6,901,101; claim 1, lines 8-12);

wherein the resonator is internal to the source, forming a cavity of a mode-locked source(6,901,101; claim 14).

Note: claim 1 above is not limited to sub-optical frequencies.

2. The sensor of claim 1, wherein the resonator comprises a dielectric resonator(6,901,101; claim 1, lines 8-9).

22. A method of sensing a measurable parameter, the method comprising(6,901,101; claim 43, lines 1-2):

providing a resonator characterized by a resonant frequency that is a function of a variable gap in an internal cavity of a dielectric body of the resonator, the variable gap being responsive to the measurable parameter(6,901,101; claim 43, lines 5-11);

supplying sub-optical electromagnetic energy to the resonator to produce an electromagnetic standing wave in the dielectric body and the variable gap(6,901,101; claim 43, lines 12-14); and

sensing a sub-optical resonant frequency of the electromagnetic standing wave to determine the measurable parameter(6,901,101; claim 43, lines 15-16).

23. A method of sensing a measurable parameter, the method comprising the steps of(6,901,101; claim 49, lines 1-2):

providing a pulsed sub-optical electromagnetic signal characterized by a repetition rate(6,901,101; claim 49, lines 3-4);

providing a resonator having a dielectric body with a variable gap that varies in response to changes in the measurable parameter(6,901,101; claim 49, lines 8-11);

supplying the pulsed sub-optical electromagnetic signal to the resonator to produce a pulsed electromagnetic wave pattern in the dielectric body and the variable gap(6,901,101; claim 49, lines 12-16); and

sensing variations in the repetition rate of the pulsed sub-optical electromagnetic signal in response to variations in the variable gap(6,901,101; claim 49, lines 17-18).

Note: the 6,901,101 Patent clearly defines that "the laser energy is preferably in the visible or infrared region, though the laser energy may be within the far-infrared and microwave regions as well"(column 5, lines 8-9). Claims 43(6,901,101) and 49(6,901,101) are not limited to an optical resonator.

Claims 5 and 6 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 12, 14, 30, 33, and 34 of U.S. Patent No. 6,901,101. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claimed

limitations of the instant application are obvious in view of the claimed subject matter of U.S. Patent No. 6,901,101.

5. The sensor of claim 1, wherein the measurable parameter is selected from the group consisting of pressure, temperature, flow rate, material composition, force, and strain(6,901,101; claim 8).

6. The sensor of claim 1, further comprising a measuring apparatus for measuring a repetition rate of the energy(6,901,101; claim 12).

Claims 8/1 and 12/1 of the 6,901,101 Patent depend on claim 1(6,901,101) not on claim 14(6,901,101). However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the apparatus of claim 14/1(6,901,101) to measuring any of the parameters claimed in claim 5/1 of the instant application. This is because the measured parameters claimed, especially pressure and strain, as found in claim 1; 6,901,101 will change the variable gap. Further, the output of the claimed sensor for claim 14/1(6,901,101) must be detected, and as found in claim 12/1(6,901,101) pulse repetition rate for the pulsed source of claim 1;(6,901,101) would have been obvious because of the function of the resonant cavity of claim 1;(6,901,101).

Relevant Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nerheim(4,053,897), see figures 9 and 10; and Joshi et al(6,407,555), see figures 6-8.

Allowable Subject Matter

Claims 3, 4, 10 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 17 and 20 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. § 112, second paragraph, set forth in this Office action.

With regard to claims 3 and 4, the prior art of record fails to teach "that the resonator comprises a resonant antenna or transmission line in combination with the limitations of claim 1.

With regard to claim 10; the prior art of record fails to teach the limitation of "the resonator is internal to the source and forms a cavity of the source" in combination with the remaining limitations of claim 9.

With regard to claim 26, the prior art of record fails to teach the limitation of "sub-optical electromagnetic energy is a pulsed energy and the characteristic is repetition rate" in combination with the remaining limitations of claim 24.

With regard to claim 17, see the office action of 8 June 2006.

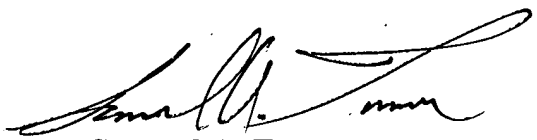
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A. Turner whose phone number is 571-272-2432.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached on 571-272-2800 ext. 77.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Samuel A. Turner
Primary Examiner
Art Unit 2877